

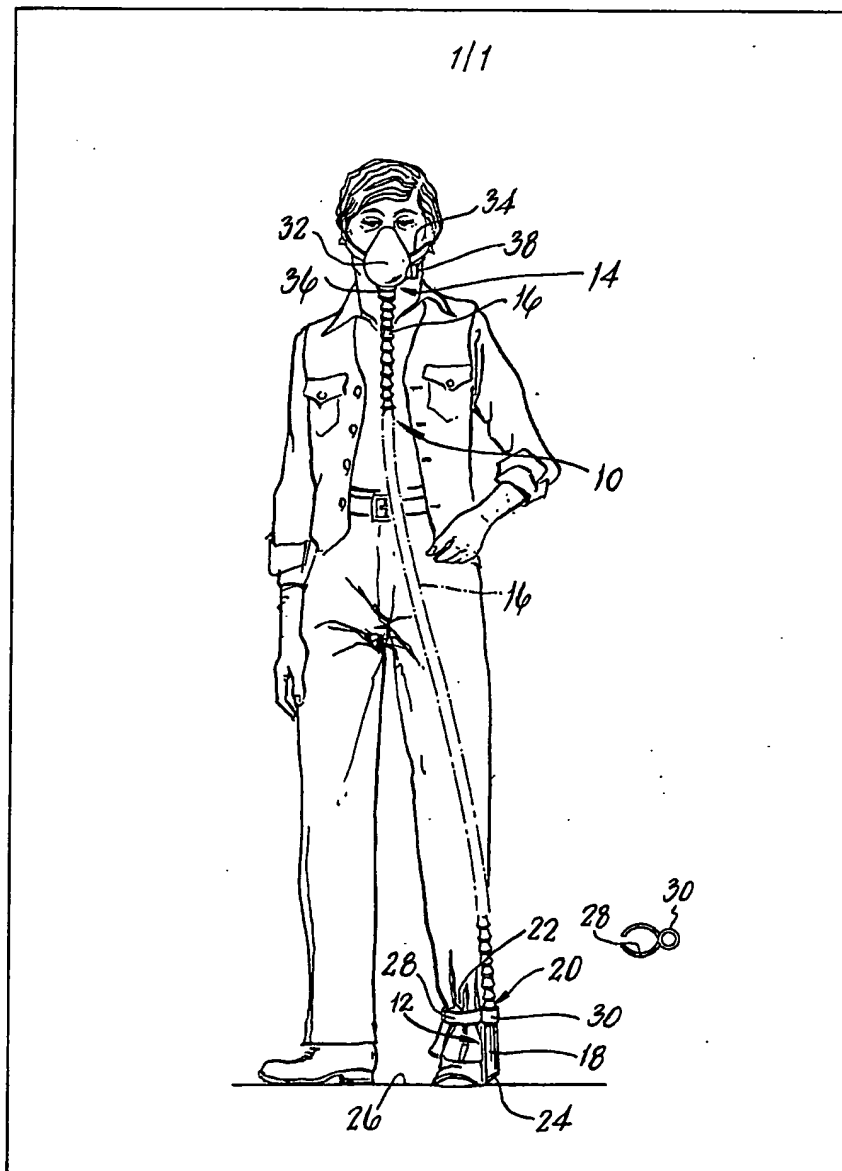
(12) UK Patent Application (19) GB (11) 2 134 393 A

- (21) Application No 8401842
(22) Date of filing 24 Jan 1984
(30) Priority data
(31) 8302029
(32) 25 Jan 1983
(33) United Kingdom (GB)
(43) Application published
15 Aug 1984
(51) INT CL³
A62B 7/12
(52) Domestic classification
A5T BA
(56) Documents cited
GB 1587812
GB 1296563
GB 0732248
GB 0489475
GB 0464980
GB 0457663
WO 82/02492
WO 83/00632
(58) Field of search
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(54) Breathing aid

(57) A breathing aid 10 comprises an air intake 12, a mask 14 and an air tube 16 extending between the air intake and

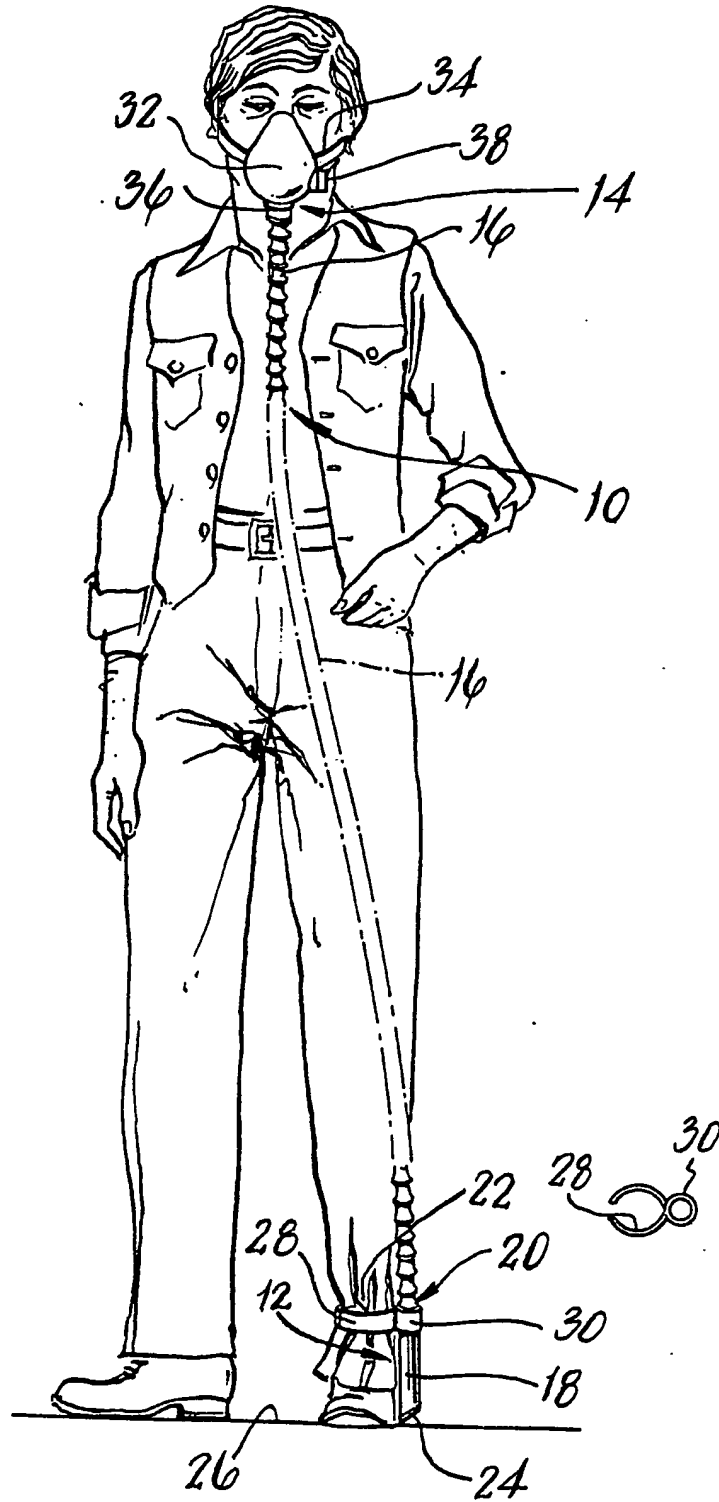
the mask. The air intake is secured to the user's ankle by means of a clip 30 so as to touch the surface of the floor 26. Air is drawn in by the user through an angled inlet opening 24 to the mask. One way valves in the mask cause air to be drawn in only through tube 16 and exhaled only through an outlet opening 38. Tube 16 is flexible and permits the user to stand upright in a smoke filled room while breathing relatively clean air from floor level.



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SPECIFICATION

Breathing aids

5 This invention relates to breathing aids and to a method of separating air to be breathed from contaminated air. In particular, but not exclusively, the invention relates to breathing aids for use in fires, that is to say, to fire escape aids. For example, the invention is particularly applicable to breathing aids for use by persons who find themselves obliged to spend some time in a smoke-filled room before help arrives. Such a situation can arise when fire occurs in a lower region of a multi-storey block of flats.

Presently available breathing aids for use by persons in smoky atmospheric conditions such as the situation mentioned above include filter-type units providing a mask which fully encloses the head of the user and is provided with a transparent window and a chemical filter unit whereby air containing smoke drawn into the mask by the user is filtered and is intended thereby to be rendered breathable. The whole apparatus resembles somewhat a World War II gas mask.

Problems arising from the presently available apparatus mentioned above include its high initial cost, its limited shelf life and the necessity for regular checks to be made on its state of readiness, together with the fact that the mask itself is somewhat unacceptable to persons suffering from claustrophobia and asthma.

An aim of the present invention is to provide means and a method for improving presently available breathing aids and methods and/or to offer improvements in relation to one or more of the problems identified above.

According to the invention there is provided a method of separating air to be breathed from contaminated air as defined in the accompanying claims. The invention also provides a breathing aid as defined in the accompanying claims, including a breathing aid in combination with instructions for use of said aid in a method of separating air to be breathed from contaminated air, as defined. Such a breathing aid may be in the form of a fire escape aid.

In an embodiment described below the tube connecting the air intake means to the air delivery means is flexible and of sufficient length to extend from the human mouth region to the human ankle region. Quick attachment means may be provided for securing the air intake means to the ankle region of a user. The air intake means may be provided with an air intake opening which, in use, faces downwardly and outwards away from the feet of the user.

The tube connecting the air intake means and the air delivery means may be provided with visual signalling means. For example, the tube may be provided with a bright colour or fluorescent surface finish.

The internal diameter of the tube connecting the air intake means to the air delivery means may be in the range of 10 to 50 millimetres, and preferably in the range 20 to 40 millimetres. The tube is preferably formed of a flexible plastics material such as poly-

vinylchloride.

Preferably the air delivery means comprises a mask connected to the air tube. The mask may be adapted to fit over the nose and mouth region only of the user. Resilient means such as a strap may be provided to pass around the back of the head of the user to hold the mask in its operating position.

An air outlet opening is preferably provided in the mask together with valve means to allow air only to enter the mask through the air tube and only to leave the mask through the outlet opening during use.

The mask may be provided with air filtering means to remove impurities from air entering the mask from the air tube.

The invention also provides any feature or concept or combination of features defined and/or described and/or illustrated in this specification and drawings.

In an embodiment described below the air intake means is positioned at floor level and the air delivery means is at head height for an adult user and the user is able to breath in air from floor level which, in the normal fire situation in a building, is comparatively smoke-free. As a result, there is no need to provide air filtering means to remove smoke from the air drawn in by the user, and the breathing aid can therefore be extremely simple consisting only of a mask with associated valves and a downwardly extending air tube leading to the air intake means. In the case where air filtering means is in any case provided, the apparatus described in the embodiment allows air to be delivered to the filtering unit with much less smoke, or no smoke at all, whereby the effectiveness and operating life of the filter unit is considerably enhanced.

An embodiment of the invention will now be described by way of example with a reference to the accompanying drawing which shows a person using a breathing aid according to the invention.

As shown in the drawing, a breathing aid 10 comprises air intake means 12, air delivery means 14 and an air tube 16 extending between the air intake means and the air delivery means.

Air intake means 12 comprises a pipe 18 of plastics material which extends downwardly from quick-attach connection means 20 whereby the air intake means is detachably secured to the ankle 22 of the user. The lower end 24 of pipe 18 provides an air intake opening facing downwardly and outwardly of the user at an angle of from 20° to 40° with respect to the floor surface 26, and preferably at 30° with respect thereto.

Quick-attach connection means 20 comprises a resilient clip 28, similar to a trouser clip as used by cyclists and formed with a collar 30 to receive the upper end of air intake pipe 18.

Air delivery means 14 comprises a mask 34 of flexible plastics material and similar in construction to a conventional oxygen mask as used in medical services. A resilient strap 34 is provided to pass round the head of the user to hold mask 32 in position.

At the lower end of mask 32 an air connection tube provided on mask 32 is connected to air tube 16 and the latter tube extends downwardly to air intake pipe 18.

Valve means (not shown) is provided in mask 32 to control the flow of air into and out of the mask. An air outlet opening 38 is provided at one side of the mask to allow air to be discharged therefrom and the valve means is arranged to ensure that air can only be discharged through the outlet and only be drawn in through connection tube 36, whereby the user always obtains air from floor level and discharges air after breathing it, at head level. The valve means may comprise a pair of flap valves, for example, formed from plastic material and each operating as a one-way valve to permit only a one-way flow into and out of the mask.

Air tube 16 is formed of a flexible plastics material and is provided with ribs for extra strength. The tube is formed of polyvinylchloride and is provided with a highly visible fluorescent surface finish to attract attention. The internal diameter of tube 16 lies in the range of from 10 to 50 millimetres and preferably in the range from 20 to 40 millimetres.

In use, the breathing aid is put on by the user in the manner shown in the drawing. The user draws in air through air intake pipe 18 and this air passes up through air tube 16 and the one-way inlet valve in mask 32 and is breathed by the user. On breathing out the exhaled air is prevented by the air inlet valve from passing back into air tube 16 and freely passes out of outlet opening 38 through the one-way air outlet valve.

Thus, the user breathes in air from floor level and breathes out air at head level. The air at floor level is usually smoke-free and thus perfectly breathable. The air exhaled at head level does not significantly disturb the smoke at that level and thus does not interfere with the supply of smoke-free air to the air intakes means.

During use in a fire, the user puts on the apparatus as soon as the fire is discovered and can then freely move around in a smoke filled room while obtaining an adequate supply of breathable air. In the case of persons trapped in a building and awaiting rescue by the fire services, the user will usually move to the region of a window and can then open the window and disconnect air tube 16 and air intake pipe 18 together with clip 28 from his or her ankle and pass to the end of the air tube out through the window and allow it to dangle freely outside the building. In this way, air is then drawn in to mask 32 from outside the building. In this way, air is then drawn in to mask 32 from outside the building. Such air is in most cases clean and smoke-free air since the smoke from the room where the user is trapped passes out through the window and then immediately upwards so that the region where the air intake means is located is substantially smoke-free, it being a characteristic of smoke that it does not rise up the walls of a building close to the walls but leaves a smoke-free zone close to the walls and it is into this zone that the air intake opening is passed.

Many modifications can be made in the above-described embodiment without departing from the scope of the invention including changes to the design and construction of the mask, the valves, the air tube and the air intake means.

In a further embodiment the mask 32 is replaced

by a mask assembly comprising air filtering means for removing smoke or other non-breathable matter from the air, so that the air delivered to the filter is obtained from floor level and thus contains less matter to be removed.

The invention is not limited to the use of the breathing aid in relation only to users capable of walking, and the invention is applicable also to, for example, hospital patients and in such a case the air intake means would be clipped to a portion of the frame of a hospital bed close to floor level while the patient is wheeled out of a smoke-filled room.

The invention is also applicable to breathing hazards other than smoke, including chemical materials, gases and vapours.

Tube 16 acts by virtue of its fluorescent and brightly coloured finish as a signalling device to attract attention when, during use, it hangs from the window of a building as described above, and otherwise.

In the above embodiment quick-attach connection means 20 also constitutes means for mounting or securing the air intake means at a chosen height with respect to the floor of the room or other location where the apparatus is used. Alternative means for mounting the intake at such a chosen height may of course be devised according to the intended use. For example, suitable means may be devised for attaching the intake to a user's clothing or for attaching the intake to, for example, the frame of a hospital bed where the device is to be used in such a location.

Regarding the depth or height of the band of breathable air within a smoke filled room from which the air intake should draw the air to be breathed, the physical height or depth of such a band varies according to the nature and location of the fire. In any case, the least contaminated air in such a situation is the air immediately adjacent the floor itself. Therefore, it is preferable that the air intake be positioned actually to touch the floor so that air can still be drawn in through its angled inlet opening 24 - as shown in the drawing. Nevertheless, for certain situations the air intake may be mounted somewhat higher. Normally, the maximum recommended height of the intake would be 15 centimetres above floor level and it is thought that the limit of benefit obtainable by the apparatus of the invention would be 30 centimetres above floor level. However, the optimum intake height is in the 0 to 7.5 centimetres range from the floor.

CLAIMS

1. A method of separating air to be breathed from contaminated air comprising the steps of:
 - providing air intake means, air delivery means to deliver air from the air intake means to the mouth and/or nose of the user, and a tube or duct connecting the air intake means to the air delivery means; and
 - applying suction to said tube to draw air into the air intake means
- characterised in that
- said air intake means is located to draw in air from

a zone of air of lower contamination than an adjacent zone.

2. A method according to claim 1 characterised in that said zone of lower contamination is at floor level
5 in a smoke-filled room.

3. A method according to claim 2 characterised in that said air intake means is secured to the body or the clothing of the user in the region of the ankle or foot.

10 4. A method according to any one of the preceding claims characterised by the provision of valve means and air outlet means associated with said air delivery means, whereby said air to be breathed is drawn from said tube to said air delivery means and
15 so to the user's nose or mouth, and whereby respired air passes to the atmosphere through said outlet means.

5. A breathing aid comprising air intake means, and air delivery means to deliver air from the air
20 intake means to the mouth and/or nose of the user, the air intake means being connected to the air delivery means by a tube or duct, characterised by means for positioning said air intake means so as to draw in air from a zone of lower contamination than
25 an adjacent zone.

6. A breathing aid according to claim 5 wherein said tube or duct is flexible and is of sufficient length to extend from the human mouth region to the human ankle region;

30 7. A breathing aid according to claim 6 characterised by quick attach means whereby said air intake means may be secured to the ankle region of the user.

8. A breathing aid according to any one of claims
35 5 to 7 characterised in that said air delivery means comprises a mask to fit on the user's face.

9. A breathing aid according to claim 8 characterised in that said mask has an air outlet and valve means therefor.

40 10. A breathing aid according to claim 5 in combination with instructions for the use of the aid in a method as defined in claim 1.